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Applications of synchrotron based micro-XRF techniques in plant biology

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The development of synchrotron radiation-based spectroscopy and microscopy techniques has opened new possibilities to study the structure and biochemical composition of plant organs, tissues, cells and biomolecules, which is critical for both basic and applied research.

In this talk, the application of synchrotron-based micro-X-ray fluorescence and X-ray absorption spectrometry in plant biology at different European synchrotron radiation facilities will be presented as tools to reveal the mechanisms of metal uptake, accumulation and metabolism in plants to better understand metal toxicity and tolerance mechanisms, for the purpose of risk assessment and restoration of heavy metal polluted sites. In addition, food quality and safety present an important aspect, connected to mineral malnutrition on one side and metal pollution on the other. Cereals, as major staple foods, accumulate only low amounts of essential trace elements like iron and zinc, while on the other hand, they can contain elevated amounts of hazardous cadmium. Designing high mineral nutrient and low hazardous element crops present a challenge for modern plant breeders.

Synchrotron-based micro-XRF techniques with focused beam can assist in revealing element accumulation and speciation patterns at tissue and cellular levels and help breeders to choose suitable crop genotypes.

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